Source Control Early Action Focused Feasibility Study

Engineering Presentation

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Remedial Options Workgroup Meeting
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Outline

- Target Area Selection
- Alternative Development
- Conceptual Designs
- Dredged Material Management Scenarios
- Volume Estimates
- Cost Estimates
- Detailed Analysis

Target Area Selection

- CSM: Fine grained sediments of lower 8 miles identified as major source of contamination
- Remediation of discrete areas unable to effect sufficient risk reduction
- Six active alternatives developed to consider entire lower 8 miles

Alternative Development: Technology Classes Considered

- Capping ✓
- Dredging ✓
- *In situ* treatment
- *Ex situ* treatment ✓
- Beneficial use ✓
- CDFs/CADs ✓
- Offsite Disposal

Alternative Development: Navigation Depths in MLW

River Mile	Constructed Dimensions of Authorized Channel	Current Usage	Future Usage
RM0 – RM1.2	30	30	30
RM1.2 – RM2.5	30	16	16
RM2.5 – RM3.6	20	Existing	16
RM3.6 – RM4.6	20		10
RM4.6 – RM8.1	16		10
RM8.1 – RM8.3	10		10

Definitions and Acronyms

Term	Definition
NCC	Navigationally Constrained Capping: Placement of cap following construction of a navigation channel.
PEZ	Primary Erosional Zone: Area of the Lower Passaic River in which there exists a greater amount of surface area that may erode as compared to other areas of the river.
PIZ	Primary Inventory Zone: Area of the Lower Passaic River in which there exists a relatively greater contaminant inventory as compared to other areas of the river.
Shoals	Area between the navigation channel and the shoreline.
Pre-dredging	Dredging conducted in order to accommodate placement of cap materials.
Cap	Layer of material placed over contaminated sediment to reduce migration of contamination from the underlying sediment.
Backfill	Material placed to mitigate dredging residuals; unlike a cap, backfill is not required to be maintained after placement.
Inventory	The quantity of a particular contaminant in a given area or river reach with units of mass.

Alternatives

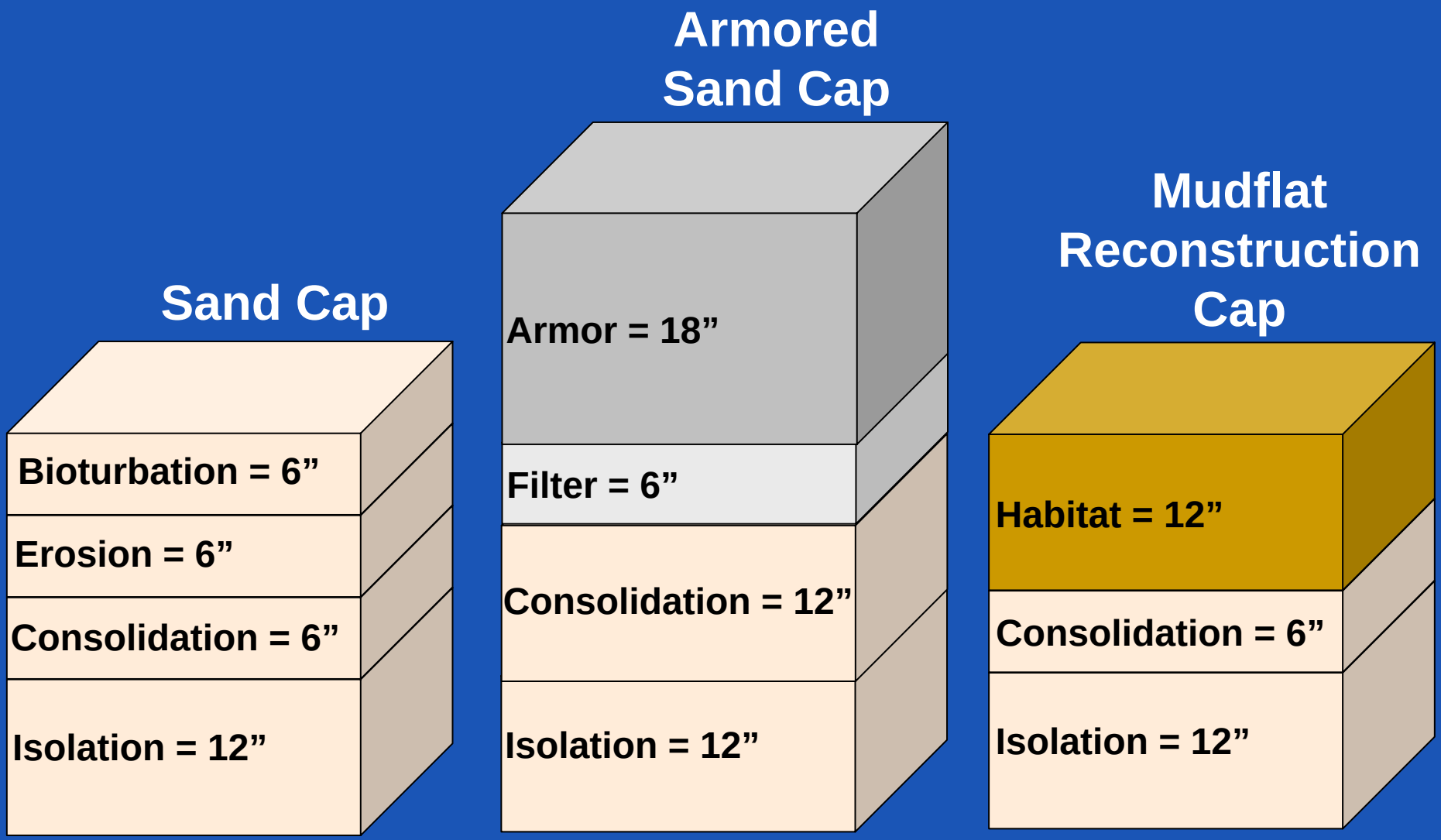
- No Action
- Alternative 1: Dredging
- Alternative 2: Capping
- Alternative 3: NCC – Authorized Channel
- Alternative 4: NCC – Current Usage
- Alternative 5: NCC – Future Usage
- Alternative 6: NCC – Future Usage & Dredging PEZ/PIZ

NCC – Navigationally Constrained Capping
PEZ – Primary Erosional Zone
PIZ – Primary Inventory Zone

Conceptual Design: Dredging

- Mechanical dredging identified as representative process option
- Productivity: 2000 cy/day per dredge
- Accuracy: 1-ft overdredge allowance
- Residuals: 2-ft backfill
- Resuspension: Minimize using BMPs
  - No dredge area containment used in conceptual design/cost estimation
- Side slopes: 3H:1V

Conceptual Design: Capping

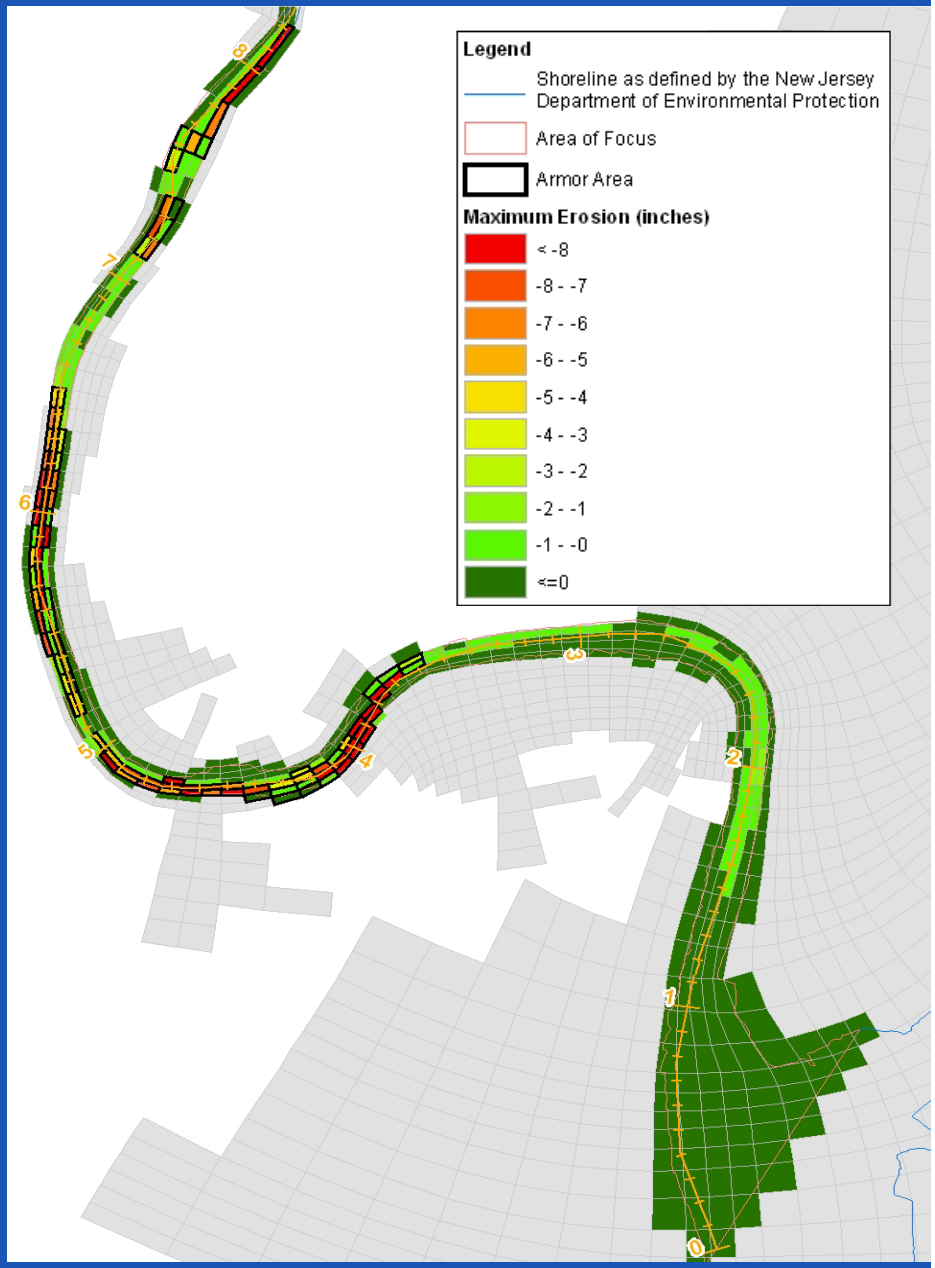


Capping Evaluation

- Cap material: Borrow source evaluation
- Cap placement: Lowered clamshell or hydraulic diffuser
- Cap stability and armor layout
- Conceptual design

Cap Stability

- Cap Erosion Modeling
  - Existing hydrodynamic model (ECOM) coupled with sediment transport model (SEDZL-J)
  - Predicts erosion/ deposition of cap material during extreme flow events
- Geotechnical evaluation
  - Armor size
  - Slope stability (static)



Flooding Analysis Approach

- Hydrodynamic model ECOM calibrated using 2004 dataset
- Model grid includes FEMA 500 year floodplain
- Water surface elevations generated under flow or surge conditions
- Modeled elevations compared to local topography
- Validated against FEMA results for the region, as well as recorded elevations due to Hurricane Donna (1960)

Flooding Analysis Results

- Modeled 100Q, 100S, 500Q, and 500S
- Under surge conditions, no modeled change in flooded area observed among alternatives
- Alternatives 1, 3, and 6 not modeled, but have greater water depths than Alternative 5, which showed a decrease in flooded area under flow conditions.

100 Year Flow Results

Modeled Scenario	Flooded Area (acres)
Base Case	499
Alternative 2	523 (full predredging) 592 (partial predredging)
Alternative 4	523
Alternative 5	482

Volume Estimates

- Removal volumes are based on:
  - Depth of contamination
  - Navigation
  - Predredging for cap
  - 3H:1V side slopes (slope stability analysis)
  - 1 foot overdredge allowance
  - Mudflat reconstruction

Volume Estimates: Removal to Accommodate Cap Components

Dimension (not to scale)		FFS Assumed Dimension
	Design Vessel Depth	Alternatives vary
Authorized Channel Depth	Gross Underkeel Clearance	3′ soft bottom
	Advanced Maintenance Dredging	2′
	Future Overdredge Allowance for Channel Maintenance	1′
	Cap Protection Buffer	2′
Armor	Top of Cap	3′ in non-armored areas 5′ in armored areas
Sand	Bottom of Cap	
	Overdredge Allowance for Cap Construction	1′

Volume Estimates: Results

Alternative Number	Description	REMOVAL VOLUME (CY) [1]
1	Dredging	10,960,000
2	Capping	1,142,000
3	NCC[2] - Authorized Channel	6,979,000
4	NCC - Current Use Channel	4,432,000
5	NCC - Future Use Channel	6,148,000
6	NCC - Future Use Channel + Dredging Primary Erosion and Inventory Zones	7,010,000

[1] Total Volumes are rounded to the nearest thousand

[2] NCC = Navigationally Constrained Capping

Dredged Material Management

- Various options considered, including:
  - Offsite thermal treatment
  - Onsite/local thermal treatment
  - Onsite/local sediment washing
  - Nearshore CDF
  - *Ex Situ* Stabilization
  - Disposal
  - Beneficial Use
- Considered issues with segregation, transportation

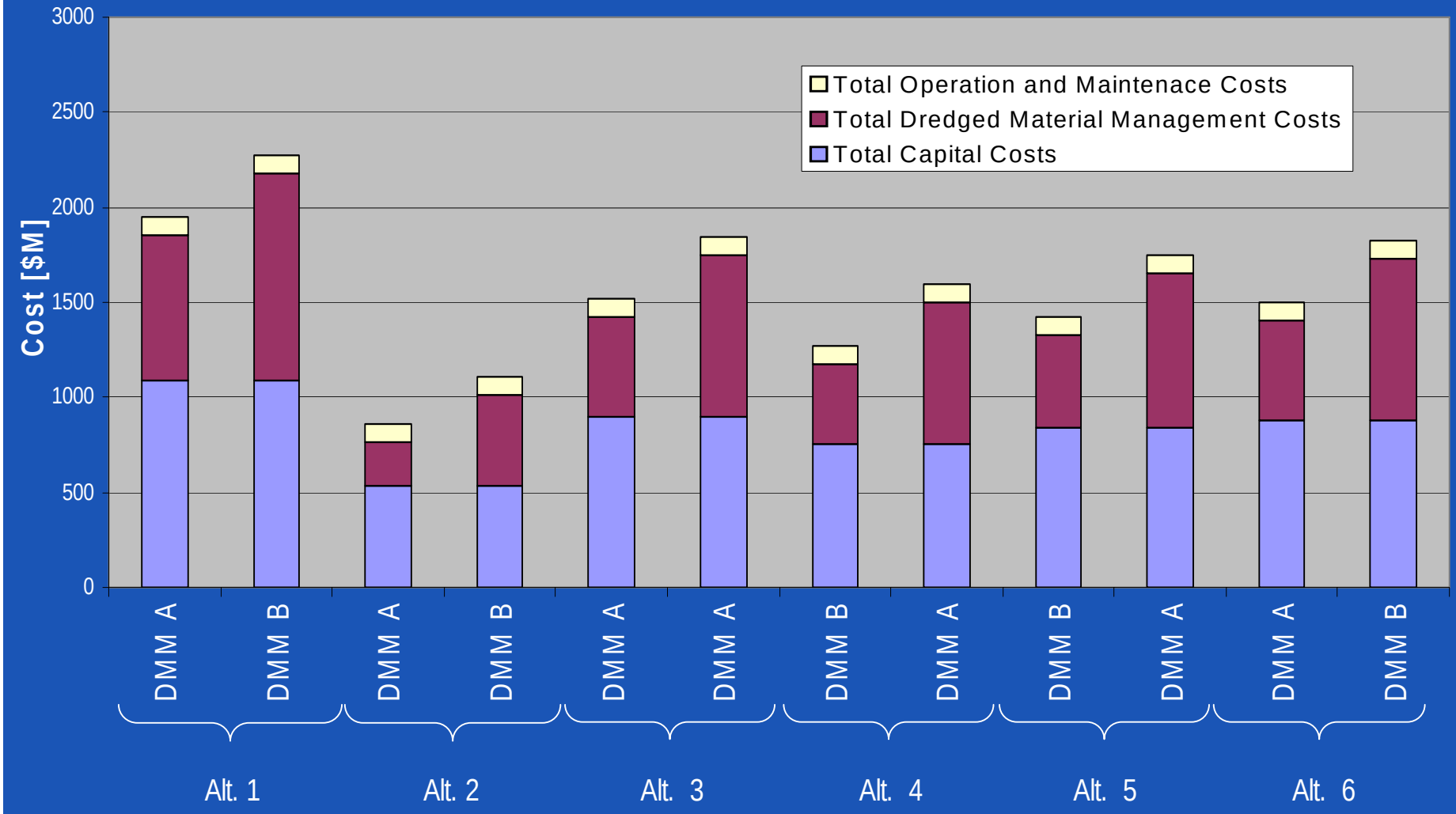
DMM Scenarios A and B

- Scenario A: Nearshore CDF Disposal
- Scenario B: Nearshore CDF Storage with Thermal Treatment and Nearshore CDF Disposal

Cost Estimates

- Pre-Design Investigation
- Design, Permitting, etc.
- Mob/Demob
- Debris Management
- Dredging
- Capping and Backfill
- Dredged Material Management
- O&M (30 years)

Cost Estimates



Alternative Comparisons Presentation

USEPA Criteria

- Overall Protection of Human Health and the Environment
- Compliance with ARARs
- Long Term Effectiveness and Permanence
- Reduction of Toxicity, Mobility, and Volume through Treatment
- Short Term Effectiveness
- Implementability
- Cost

FFS

- State Acceptance
- Community Acceptance

PP/ROD

Engineering Comparisons

Alternative	Volume (Millions of cubic yards)	Flooding (acres)	Cost ($B)
1: Dredging	11.0	≤ -17	2.0 - 2.3
2: Capping	1.1	+ 93 (1)	0.9 - 1.1
3: NCC – Authorized	7.0	≤ -17	1.5 - 1.9
4: NCC – Current Usage	4.4	+24	1.3 - 1.6
5: NCC – Future Usage	6.1	-17	1.4 - 1.8
6: NCC – Future Usage + Dredging PEZ/PIZ	7.0	≤ -17	1.5 - 1.8

(1) Previously reported value of +24 acres has been corrected to +93 acres.

Risk Assessment Comparisons

Alternative	Cancer Risks		Non-cancer Risks (Hazard Index)				Ecological Risks (Hazard Index)	
	Fish Ingestion	Crab Ingestion	Fish Ingestion		Crab Ingestion		Mink	Heron
			Adult	Child	Adult	Child		
No Action	4 x10-3	3 x10-3	6.8	31	5.2	27	52	5
1: Dredging	5 x10-4	4 x10-4	4.7	22	3.5	19	6	2
2: Capping								
3: NCC – Authorized								
4: NCC – Current Usage								
5: NCC – Future Usage								
6: NCC – Future Usage + Dredging PEZ/PIZ								
% Reduction of Active Alternatives compared to No action	88%	87%	31%	29%	33%	30%	88%	60%

Other Comparisons

- **Overall Protection of Human Health and the Environment:**
  - No Action: Would achieve some reduction in risk from current levels, but human health and ecological risks continue to be above acceptable levels. The contaminated sediment load from the Lower Passaic River to Newark Bay and the New York-New Jersey Harbor Estuary would continue.
  - Active Alternatives: Considerable ecological improvements occur in a substantially shorter period of time.
- **Long Term Effectiveness and Permanence:**
  - No action does not provide for engineering controls on the river sediments.
  - Active alternatives involving backfill do not require on-going maintenance, but require a monitoring program.
  - Active alternatives involving engineered capping require on-going maintenance for permanence and a long-term monitoring program.
- **Short Term Effectiveness:**
  - No Action: Acceptable levels of risk are not achieved within a reasonable time frame (30 years).
  - Remedy Implementation: Potential for disturbance and environmental impact depends on amount of sediment removal. Potential increases with increasing removal.

July 16
Comments on Draft FFS Due

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Questions?